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NOTES ON NORTH AMERICAN HEPATICAE. VII*

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(WITH PLATE II)

Of the ten species noted in the present paper five represent additions to the flora of North America, north of Mexico. Four of these additions, including a species of *Cololejeunea* proposed as new, were found in Florida; the fifth was found in Wisconsin and British Columbia. Two other species which are included have recently been reported as American by other writers. Of the three remaining species one is introduced for nomenclatorial reasons and the other two to record extensions of range.

1. PLAGIOCHASMA INTERMEDIUM Lindenb. & Gottsche. *Aitonia japonica* Steph. Bull. Herb. Boissier **5:** 54. 1897. *Plagiochasma japonicum* Massal. Mem. Accad. Verona **73:** 47. 1897.

In the writer's recent revision of the North American species of *Plagiochasma*,[1] specimens from Japan are listed under *P. intermedium*, and the identity of *P. japonicum* with the North American species is claimed. Through an unfortunate oversight, however, the Asiatic species was not formally listed among the synonyms of *P. intermedium*. It is not possible to record any additional stations for the species at the present time.

2. PLAGIOCHASMA WRIGHTII Sulliv.

Collected in March, 1915, in the Arbuckle Mountains, near Davis, Oklahoma, on dry travertine formations, by W. H. Emig (No. 1030). A noteworthy extension of range. Formerly known from one station in Texas, one in Arizona, and four in Mexico.[2]

3. BUCEGIA ROMANICA Radian, Bull. Herb. Inst. Bot. Bucarest 3–4. 1903.

The discovery of this remarkable liverwort by A. H. Brinkman was announced by Miss Haynes[3] over a year ago. His specimens were collected in the following localities, altitudes 7200–8800 feet: Willock Mountain and Mt. Bosworth, near Stephen, Alberta, July, 1913 (Nos. 792 and 822); Long Lake, south of Pharaoh, Alberta, August, 1915 (No. 983); Cathedral Mountain, Hector, British Columbia, July, 1913 (Nos. 810, 811 and 812). They are unfortunately

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* Contribution from the Osborn Botanical Laboratory.

[1] Bull. Torrey Club **42:** 259-308. f. *1–8*. 1915.

[2] See Evans, *l. c.* 295. 1915.

[3] BRYOLOGIST **18:** 93, 94. *f. 1*. 1915.

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sterile, but the structure of the thallus, which is figured by Miss Haynes, is so distinctive that there can be little doubt about the correctness of the determination. The genus *Bucegia* is monotypic. The type material was collected by its author, Simeon St. Radian, in the Bucegi Mountains of Rumania, in 1899. Specimens from the same mountains, collected by K. Loitlesberger in 1897, are likewise noted in the original account. The genus is accepted without question by K. Müller,[1] who adds a number of interesting details and figures the structural features of the thallus. He was unable, however, to cite any additional localities. In the following year Schiffner[2] recorded *B. romanica* from five stations in the Tatra Mountains of Austria, as well as from the two Rumanian localities. He likewise gave an exhaustive account of the plant and brought out in his figures the morphological characteristics of the male and female receptacles. A few years later he[3] reported additional stations in the Tatra Mountains and stated that he knew the plant from ten stations in all in that portion of Austria. Apparently no other European localities are known, and the report of the species from British Columbia and Alberta is therefore of unusual interest.

The genus *Bucegia* is a representative of the higher Marchantiaceae, the so-called Compositae of Leitgeb. It agrees with *Marchantia* and *Preissia* in having compound or dolioform epidermal pores in the vegetative thallus. The inner opening of the pore approximates the cruciate condition found in *Preissia* and certain species of *Marchantia* (for example, *M. paleacea* Bertol.)[3] In other words the cells bounding the opening approach one another very closely and leave a narrow four-rayed space, which may be partially or wholly closed by an increase in the turgidity of the cells. Although the pores are essentially the same as in *Marchantia* and *Preissia* the air-chambers and photosynthetic tissue are very different. Instead of being in a single layer the air-chambers are often in two or more layers; while the photosynthetic tissue, instead of being in the form of upright rows of cells, is represented by the walls a single cell thick separating the air-chambers from one another. The type of air-chambers found in *Bucegia* does not recur in any of the other Compositae but is found in *Reboulia*, *Asterella* and other genera belonging to the group Operculatae of Leitgeb. Here, however, it is always associated with simple epidermal pores.

The compact tissue below the air-chambers shows none of the sclerotic cells which form so distinct a feature in *Preissia* and in many of the species of *Marchantia*. It even lacks oil-bodies and is composed of thin-walled parenchyma throughout. The ventral scales are in two rows, differing in this respect from *Marchantia* but agreeing with *Preissia* and the other Compositae. The scales have the usual semicircular or broadly lunulate form and each one bears a single lanceolate appendage. Both rhizoid-initials and cells containing oil-bodies are absent.

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[1] Rabenhorst's Kryptogamen-Flora **6:** 295–298. *f. 180, 181.* 1907.

[2] Beih. Bot. Centralbl. **23^2:** 273–290. *f. 1–24.* 1908.

[3] Magyar Bot. Lapok **10:** 280. 1911.

[1] For a description of the morphological features of *Marchantia*, see Evans, Trans. Conn. Acad. **21:** 208–228. 1917.

For full accounts of the receptacles reference may be made to the published descriptions and especially to the work of Schiffner. It is sufficient to state here that the male receptacle is stalked as in *Preissia* and *Marchantia*, that the disc of the female receptacle is bluntly lobed, that the groups of archegonia (each enclosed by a membranous involucre) lie beneath the lobes, and that each sporophyte is enclosed within a pseudoperianth. Here again *Bucegia* resembles *Preissia* closely and also agrees with such species of *Marchantia* as the Asiatic *M. geminata* R. Bl. & N. and its allies. The photosynthetic tissue of both receptacles is, however, essentially the same as in the vegetative thallus and therefore differs markedly from the branched rows of cells found in both *Preissia* and *Marchantia*.

4. FOSSOMBRONIA LAMELLATA Steph. Hedwigia **33:** 9. 1894. *F. tuberifera* Goebel, Organographie der Pflanzen 292. *f. 190, 191.* 1898. [FIGS. 1–4.]

Collected in December, 1915, May, 1916, and January, 1917, at Sanford, Florida, by S. Rapp (No. 80). New to North America. The species is characterized by the possession of numerous tubers, some of which are highly differentiated while others are more rudimentary. The material collected in 1917 shows mature capsules.

Apparently Ruge, in 1893, was the first to describe tubers in the genus *Fossombronia*.[1] His material, which he does not attempt to name, was collected by Goebel at Tovar, Venezuela. He states that the stem of a tuberiferous plant turns downward instead of upward and becomes swollen at the apex, the enlarged portion, or tuber, being filled with stored food, some of which is in the form of starch. One of his figures shows the change in the direction of growth, but no sign of a tuber, although the leaves exhibit a characteristic reduction in size.

The following year Stephani described *F. lamellata* from Argentine specimens in the Otto Kuntze herbarium, collected by R. Hauthal at Buenos Aires, no other material being cited. He makes no mention of tubers but gives an account of the vegetative structure and capsules and doubtfully assigns a monoicous inflorescence to the species.

A few years afterwards, in 1898, Goebel published his *F. tuberifera*, giving a general account of the plant and two interesting figures in which the characteristic tubers are brought out. One figure (*f. 190*) shows a short plant with archegonia, which has grown out from the tip of an old tuber; the stem, without branching, turns abruptly downward and swells distinctly at the apex into a new spherical tuber. The other figure (*f. 191*) shows a plant which bears a sporophyte, while the apex of the stem is beginning to show the characteristic modification into a tuber. Goebel's material of *F. tuberifera* came from Peldegue, Chile, and he doubtfully assigned to the same species the *Fossombronia* from Venezuela which Ruge had already discussed.

In 1900 Stephani[2] published a new description of his *F. lamellata* and cited *F. tuberifera* definitely as a synonym. In addition to Hauthal's specimens he listed Goebel's Venezuelar material but made no mention of the Chilean type of *F. tuberifera*. This time he described the tuberous and leafless apices of the stem and stated definitely that the inflorescence was dioicous.

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[1] Flora **77:** 305, 306. *pl. 4, f. 6; text f. 14.* 1893.

[1] Mém. Herb. Boissier **16:** 30. 1900.

It will be seen that *F. lamellata*, according to the published records, has a wide distribution in South America, being known from Argentina and probably from Venezuela and Chile as well. Mr. Rapp's specimens seem to be constantly dioicous, and the spores agree closely with Stephani's description. It seems safe, therefore, to refer the plants to *F. lamellata*, and the discovery of this species in Florida marks an interesting extension of range to the northward. The spores measure 36–44μ in diameter and the spherical surface is covered over with a fine reticulum, the meshes measuring 8–9μ across. In most cases the reticulum is regular, but sometimes the low ridges of which it is formed leave an occasional mesh incomplete. The elaters are about 8μ wide and show two distinct spirals. It will be seen from this description that the spores and elaters are much like those of the more northern *F. foveolata* Lindb. This species differs, however, in its annual habit, lack of tubers and monoicous inflorescence. In *F. salina* Lindb., a common Florida species, the spores are likewise reticulated, but the meshes are coarser and are often incompletely formed. This species is likewise monoicous and lacks tubers, although it agrees with *F. lamellata* in being perennial.

One of the largest of the Florida specimens is shown in FIG. 1. After bearing a series of leaves and a small cluster of archegonia, one of the branches abruptly turned downward, ceased forming leaves, and became swollen into a spherical tuber densely covered with rhizoids. The other branch, only the base of which is shown, behaved similarly. In addition to these terminal tubers the plant bore a number of smaller oval or clavate tubers on the tips of leafless and short adventitious branches arising from the ventral surface. These tubers lacked rhizoids completely although some of them showed indications of very rudimentary leaves.

A much simpler condition is shown in FIG. 2. In this case a tuber gave rise to a leafy shoot from the apex, and this shoot, without branching, developed a new apical tuber. The leaves produced were all irregular and rudimentary, there were no sexual organs, and the new tuber was destitute of rhizoids; on its surface it bore a series of projecting cells or groups of cells, but these were irregularly arranged and could hardly be interpreted as leaves. The plant here figured behaved in much the same way as the one shown in Goebel's *f. 190*, except that the latter developed archegonia and much larger leaves.

Conditions approximating those shown by Ruge are represented in FIGS. 3 and 4, although a change in the direction of growth is scarcely or not at all apparent. The plants here figured showed a gradual decrease in the size of the leaves, accompanied by a marked irregularity in their form, while the apices of the stem were leafless or nearly so without being tuberous. In FIG. 3 a single antheridium with a small subtending scale is shown.

In some of Mr. Rapp's specimens the tuberiferous shoots are much more elongated than any of those figured, but the more important variations have been shown. Most of the rhizoids, as is usual in *Fossombronia*, are deep vinous purple. They are represented in FIG. 2 and on the terminal tuber in FIG. 1. The small tubers in FIG. 1 were practically free from rhizoids, and the same thing was true of the two shoots shown in FIGS. 3 and 4 and of the long leafless portion of the shoot in FIG. 1. In the leafy portion of this shoot, however, rhizoids were present in abundance, although omitted from the drawing.

In connection with *F. lamellata* it should be remembered that tubers have been described in the case of the Californian *F. longiseta* Aust. In his description of this species Howe,[1] in 1899, stated that the stems were "commonly somewhat tuberously thickened at the apex and perennial through the resumption of apical growth on termination of the dry season." Humphrey,[2] several years later, treated the matter at greater length and figured "an example of tubercular thickening of stem," which bears a striking resemblance to some of the small tubers shown in FIG. 1. He found that fungal hyphae were present in the tubers and thought at first that the fungus might bear a causative relation to them. He afterwards found, however, that plants which were kept moist produced no tubers, although fungi were still present, and he decided that the tubers were adaptive and largely dependent upon external factors for their development.[3] *F. longiseta* seems to be amply distinct from *F. lamellata:* the spores are strikingly different, and the tubers seem to be less abundant and less highly differentiated.

5. **Jungermannia Schiffneri** (Loitles.) comb. nov. *Aplozia Schiffneri* Loitles. Verhandl. der k.k. zool.-botan. Gesellsch. in Wien **55:** 482. 1905.

Collected in April, 1915, at Manitou Falls, Black River, Douglas County, Wisconsin, by G. H. Conklin (No. 1255); also in July, 1913, at Hector and Stephen, British Columbia, by A. H. Brinkman (Nos. 806, 823). New to North America.

The type material of this interesting species was found by C. Loitlesberger in the vicinity of Görz, Austria. Its occurrence in Switzerland and Tirol was soon reported by Schiffner,[4] who described a number of structural details not brought out in the original account and added a series of figures. It has since been recorded and figured from Scotland by Macvicar.[5] The illustrated description of Müller[5] may likewise be consulted.

The section or subgenus *Luridae*, to which *J. Schiffneri* belongs, is characterized by a dark green color, often masked by a brownish or purplish pigmentation; by ovate to cordate leaves; by thin-walled leaf-cells, with or without trigones; and by an ovate to clavate perianth, plicate at the mouth but not contracted into a beak. Four other species of this section are known from both Europe and North America, namely: *J. cordifolia* Hook., *J. riparia* Tayl., *J. atrovirens* Schleich., and *J. pumila* With. The first three of these are dioicous and thus differ from *J. Schiffneri* and *J. pumila*, both of which are characterized by a paroicous inflorescence.

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[1] Mem. Torrey Club **7:** 80. 1899.

[2] Ann. Bot. **20:** 86. *text f. 3.* 1906.

[3] Proc. Washington Acad. **10:** 6. 1908.

[4] Hedwigia **48:** 184–187. *f. 1–13.* 1909.

[5] Student's Handb. Brit. Hep. 147. 1912.

[6] Rabenhorst's Kryptogamen-Flora **6:** 570. *f. 285.* 1909.

If the dioicous species are left out of consideration and the two paroicous species compared, it will be found that the latter are very closely related. The size, habit, and color are much the same in both, and there are no essential differences in the shape of the leaves, in the size of the leaf-cells, in the walls of the cells, or in the perichaetial and perigonial bracts. The perianths and the valves of the capsule, however, yield important differences. In *J. Schiffneri* the perianth contracts abruptly in the upper part, the broadest part being above the middle; in *J. pumila* the perianth is gradually contracted toward the mouth, the broadest part being usually at or below the middle. In *J. Schiffneri* the cells in the outer layer of the valves have the thickenings in their radial walls arranged in such a way that every alternate wall is nearly or quite free from thickenings; in *J. pumila* the thickenings are present in equal abundance in all the walls. The walls of the inner layer, moreover, are about half as large in *J. Schiffneri* as in *J. pumila* and the spores are considerably smaller (about 15μ and 21μ, respectively). These differences are clearly brought out in the published descriptions.

A third paroicous species of the *Luridae* was recently described by Schiffner under the name *Aplozia rivularis* Schiffn.[1] He had already called attention to the plant under the name *A. pumila* var. *rivularis* Schiffn.,[2] and it is described under this name by Müller.[3] The species is now known from Bohemia, the Harz Mountains and Saxony, specimens from the last region having been distributed by Schiffner in his Hep. Europ. Exsic. No. 402. Since *A. rivularis* is probably to be expected in North America a few words about its characteristics are perhaps in place. It agrees closely with *J. pumila* but is much larger and has larger leaf-cells (40 x 20μ in the middle of the leaf, instead of 25 x 18μ). It differs also in its large cylindrical or clavate perianths, in the narrower cells of the inner layer of its capsular valves, and in its slightly smaller spores (about 16μ in diameter). *A. rivularis*, as its name implies, grows on stones in streams.

6. CEPHALOZIA LOITLESBERGERI Schiffn. Oesterr. Bot. Zeitschr. **62:** 9. 1912; K. Müller, Rabenhorst's Kryptogamen-Flora **6**^{2}**:** 45. *f. 12.* 1912.

Collected in 1915, at Barrasois, Cape Breton, Nova Scotia, by G. E. Nichols (No. 1243 b); already reported by its collector.[4] The type material of this distinct species was found near the Ladachsee in the vicinity of Gmunden, Austria, by C. Loitlesberger. Müller was able to add several new stations from Baden, Styria and Switzerland, and Schiffner soon afterwards reported the plant from Bavaria[5] and Sweden.[6] For the British Isles Macvicar[7] doubtfully recorded the species from Lancashire, the specimens which he cites having poorly developed perianths and bracts. Ingham,[1] however, lists it without question from West Lancashire and from South Aberdeen. Specimens from the original locality and from Koppelsberg in Pomerania have been distributed by Schiffner in his Hep. Europ. Exsic., Nos. 543 and 544.

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[1] Lotos **59:** 2. 1911.

[2] *l. c.* **48:** [5]. 1900.

[3] Rabenhorst's Kryptogamen-Flora **6:** 568. 1909.

[4] BRYOLOGIST **19:** 42. 1916.

[5] Oesterr. Bot. Zeitschr. **62:** 162. 1912.

[6] Ibid. **63:** 455. 1913.

[7] Student's Handb. Brit. Hepat. 454. 1912.

The group of *Cephaloziae* in which the leaves have more or less connivent lobes includes a number of closely related species. Of this group *C. catenulata* (Hüben) Dum., *C. connivens* (Dicks.) Lindb., *C. media* Lindb., and *C. pleniceps* (Aust.) Lindb. have long been known in both Europe and North America, while *C. affinis* Lindb., *C. compacta* Warnst., *C. Loitlesbergeri* Schiffn., and *C. macrostachya* Kaalaas have been published during the past few years. These recent segregates were based on European material, but *C. affinis*[2] and *C. macrostachya*[3] have since been definitely reported from North America. Now that *C. Loitlesbergeri* has been added to our flora, the discovery of *C. compacta* would not be surprising.

The essential characters of *C. Loitlesbergeri* may be briefly described as follows: the color is pale or yellowish green; the lobes of the leaves are long, entire, and usually connivent and acuminate, each being tipped by a row of from two to four cells; the leaf-cells have firm walls without trigones and average about 30μ in diameter; the inflorescence is autoicous; the innermost perichaetial bracts are deeply divided into four or more, sub-parallel and long-acuminate lobes separated by narrow sinuses; the mouth of the perianth is long-ciliate. Although the lobes of the bracts are sometimes subequal in size, the two median lobes are often longer and broader than the others, so that the lobes might be described as bifid with accessory lobes.

It will at once be seen that the essential characters of *C. Loitlesbergeri* are shared by other members of the group to which it belongs, although they occur in different combinations. In *C. connivens*, for example, the inflorescence is autoicous, the lobes of the bracts are numerous and long-pointed, and the perianth is ciliate at the mouth; in *C. affinis* the inflorescence is autoicous, and the mouth of the perianth is ciliate; in both *C. macrostachya* and *C. catenulata* the perianth is long-ciliate; and in *C. pleniceps* the inflorescence is autoicous. In *C. connivens*, however, the cells are much larger than in *C. Loitlesbergeri*, averaging 50μ or more in diameter; in *C. affinis* the lobes of the bracts are broader and blunter, and the cilia at the mouth of the perianth are shorter; in *C. macrostachya* the inflorescence is dioicous and the bracts are distinctly bifid with shorter lobes; in *C. catenulata* the inflorescence is dioicous, and the shortly bifid bracts are coarsely dentate; in *C. pleniceps* the lobes of the bracts, although sometimes more than two, are broader and acute, rather than acuminate, while the mouth of the perianth is crenulate. In *C. media*, which often grows with *C. Loitlesbergeri*, the inflorescence is dioicous, the bracts are distinctly bifid (although sometimes with supplementary teeth), and the mouth of the perianth is crenulate.

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[1] Census Cat. Brit. Hepat. 26. 1913.

[2] See Evans, BRYOLOGIST **17:** 89. 1914.

[3] See Schiffner, Hedwigia **54:** 322. 1914; also Evans, Rhodora **17:** 114. 1915.

As Schiffner has pointed out, however, the closest ally of *C. Loitlesbergeri* is *C. compacta*. In this species the inflorescence is autoicous and the mouth of the perianth long-ciliate, while the size and color of the plant and the size of the leaf-cells are much the same as in *C. Loitlesbergeri*. In *C. compacta*, nevertheless, the lobes of the leaves are acute rather than acuminate, the bracts are distinctly bifid, their divisions are shortly acute instead of being long-acuminate, and the cilia at the mouth of the perianth are shorter.

7. RADULA FLACCIDA Lindenb. & Gottsche; G. L. & N. Syn. Hep. 726. 1847.

Collected in March, 1915, on leaves of *Trichomanes sphenoides* Kunze, on Hattie Bauer Hammock, Dade County, Florida, by J. K. Small and C. A. Mosier. New to the United States but widely distributed in tropical North and South America.

In its constantly epiphyllous habit *R. flaccida* is almost unique among the American species of *Radula*. It lies closely appressed to the leaves upon which it grows, its lobes are rounded, its lobules are more or less sharp-pointed and its long, funnel-form perianth narrows very gradually toward the base. The most distinctive organs of the species, however, are its discoid gemmae, which are characterized by their large size and complex structure. Since the development, mature structure, and germination of these gemmae have been fully described and figured by Miss Williston, it will be sufficient here to refer to her paper.[1] Similar gemmae had been described a few weeks earlier in the African *E. epiphylla* Mitt. by Goebel.[2]

8. **Cololejeunea subcristata** sp. nov.

Collected in March, 1915, on leaves of *Tectaria minima* Underw., on Hattie Bauer Hammock, Dade County, Florida, by J. K. Small and C. A. Mosier (No. 5327); also on leaves of *Trichomanes Krausii* Hook. & Grev., on Nixon-Lewis Hammock, Dade County, by the same collectors (No. 6008). No. 5327 may be designated the type.

Plants delicate, pale green, often becoming bleached with age, scattered or growing in small thin patches: stems prostrate, about 0.05 mm. in diameter, irregularly and sometimes rather abundantly branched, the branches widely spreading, essentially like the stem but usually with somewhat smaller leaves: leaves loosely imbricated, obliquely to widely spreading, plane or nearly so, the lobe ovate, often arching partially across the axis dorsally, when well developed 0.4–0.45 mm. long and 0.25–0.3 mm. wide, but often considerably smaller, abruptly narrowed to a broad, acute to rounded apex, margin varying from subentire to vaguely and irregularly crenulate from projecting cells; lobule usually well developed, strongly inflated with an arched keel, ovate, about 0.15 mm. long and 0.09 mm. wide, free margin involute as far as the apical tooth, the latter usually consisting of two cells in a row, the hyaline papilla at the base of the tooth on the inner surface, proximal tooth indistinct, consisting of a rounded

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[1] Bull. Torrey Club **39:** 329–336. *f. 1–20.* 1912.

[2] Flora **104:** 156. 1912.

projecting cell separated from the apical tooth by a single cell, sinus shallow and only one or two cells long; cells of lobe averaging about 14μ along the margin and 24 x 22μ in the middle and at the base, slightly convex, trigones small but distinct, sometimes coalescent, triangular, with straight or rounded sides, intermediate thickenings occasionally present, oval; stylus reduced to a hyaline papilla: inflorescence autoicous: ♀ inflorescence borne on a more or less abbreviated branch, innovating on one side, the innovation more or less elongated, usually sterile but sometimes with a second ♀ flower; bracts obliquely spreading, complicate, vaguely crenulate along the keel but not winged, the lobe ovate to obovate, 0.45–0.5 mm. long, 0.25–0.3 mm. wide, rounded to acute, margin as in the leaves, lobule ovate, 0.2–0.3 mm. long, 0.12–0.2 mm. wide, the broad apex varying from acute to rounded, often shortly indented, margin irregularly crenulate; perianth obovoid, about 0.75 mm. long and 0.45 mm. wide, rounded to truncate at the apex with a short but distinct beak, sharply five-keeled, the keels extending below the middle, vaguely and irregularly cristate, the crests sometime double, usually interrupted, rarely more than one cell wide, irregularly crenulate or denticulate from projecting cells, surface of perianth otherwise smooth: ♂ inflorescence (so far as known) terminal on a more or less elongated branch, not proliferating; bracts in three to five pairs, imbricated, similar to the leaves but with smaller lobes and larger lobules, apparently monandrous: capsule about 0.15 mm. in diameter: gemmae broadly orbicular, about 0.04 x 0.035 mm. composed of sixteen cells, each apical quadrant cutting off two segments, margin subentire, organs of attachment not present. [FIGS. 5-14.]

The genus *Cololejeunea* is now represented in Florida by six distinct species, while the related genera *Leptocolea* and *Aphanolejeunea* are represented by one species apiece. Since all three genera include species which are exceedingly minute and inconspicuous, it would not be surprising if these numbers were substantially increased in the future. In *C. subcristata* the characteristic features are the following: the ovate leaf-lobes, longer than broad, with the apex varying from acute to rounded; the inflated lobules, with rudimentary proximal teeth; the leaf-cells with distinct trigones but without surface-papillae of any sort; and the five-keeled perianth with rudimentary crests on the keels. The crests are very variable and sometimes scarcely distinguishable; when well developed they are sometimes doubled and may show a width of two cells. This increased width, however, is usually localized and may involve a single cell only, in which case a larger tooth than the ordinary marginal crenulations is present. The gemmae belong to the simplest type known in the genus and are comparable with those found in *C. myriocarpa* (Nees & Mont.) Evans, *C. tuberculata* Evans and the various species of *Aphanolejeunea*.[1] In their lack of marginal projections and organs of attachment they come especially close to the gemmae of *C. myriocarpa*, where, however, the marginal crenulations are much more pronounced.

Among the Florida species of *Cololejeunea*, *C. subcristata* is perhaps most closely related to *C. minutissima* (Sm.) Schiffn, and *C. setiloba* Evans,[2] but in both of these species the leaf-cells are somewhat smaller, averaging about 18μ in the middle of the lobe, the walls show no local thickenings whatever, and the gemmae are larger and more complex. *C. minutissima* is further distinguished by its convex, more distant, smaller and relatively broader leaf-lobes, by its larger lobules, and by the distinctly and regularly crenulate margins of its leaves and bracts. In *C. setiloba* the remarkable lobules ,each a long and slender tooth, afford excellent differential characters. The other Florida species would hardly be confused with *C. subcristata*. *C. Biddlecomiae* (Aust.) Evans and *C. tuberculata* are both distinguished by their roughened leaves and perianths, while *C. diaphana* Evans is a much more delicate species with narrower and more pointed leaves, the elongated cells of which are almost or quite destitute of trigones.

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[1] See Evans, Bull. Torrey Club **38:** 281. 1911; also BRYOLOGIST **18:** 68. 1915.

[2] BRYOLOGIST **16:** 51. 1913.

9. LEPTOLEJEUNEA ELLIPTICA (Lehm. & Lindenb.) Schiffn.

Collected in January, 1916, on the leaves of various plants, on Royal Palm Hammock, Dade County, Florida, by J. K. Small & R. L. Lowe (Nos. 7024, 7036, 7041, 7042); also in February, 1916, at the same locality, by J. K. Small (Nos. 7045–7047, 7050–7058, 7060–7062); also in January, 1916, on Long Key Hammock, by J. K. Small (No. 7063). Genus and species new to the United States. In some of the packets listed the species is abundantly represented, in others traces only are present. Although it is not possible to give a complete list of the plants upon which the *Leptolejeunea* was found, the following partial list may be of interest: *Anacheilium cochleatum* (L.) Hoffmgg. (No. 7045), *Auliza nocturna* (L.) Small (No. 7046), *Calyptranthes Zuzygium* (L.) Sw. (No. 7060), *Chrysobalanus Icaco* L. (Nos. 7041, 7055), *Encyclia tampensis* (Lindb.) Small (No. 7050), *Guettarda scabra* Vent. (No. 7054), *Hippocratea volubilis* L. (No. 7036), *Icacorea paniculata* (Nutt.) Sudw. (No. 7062), *Ilex Krugiana* Loesener (No. 7025), *Laurocerasus myrtifolia* (L.) Britton (No. 7051), *Ocotea Catesbyana* (Michx.) Sarg. (No. 7056), *Psychotria undata* Jacq. (No. 7057), *Schoepfia chrysophylloides* (A. Rich.) Planch. (No. 7058), *Simaruba glauca* DC. (No. 7061), *Spathiger rigida* (Jacq.) Small (No. 7047), *Zamia pumila* L. (No. 7053).

The discovery of this widely distributed tropical species in Florida is of noteworthy. Although almost always epiphyllous in habit, the plants sometimes grow on bark. The blunt leaf-lobes with ocelli in a median row, the distant underleaves with setaceous divisions, the five-keeled perianth with the smooth keels projecting upward as acute or truncate horns, and the specialized caducous branches will serve to characterize the species. For a full description, with figures, reference may be made to an earlier paper of the writer.[1]

10. LEUCOLEJEUNEA CLYPEATA (Schwein.) Evans.

Collected in April, 1915, at Monticello, Florida, by E. Nelson (No. 1). The species is widely distributed in the eastern United States, but this is apparently the first record for Florida. It represents the fourth species of *Leucolejeunea* and the thirty-eighth member of the Lejeuneae to be definitely reported from

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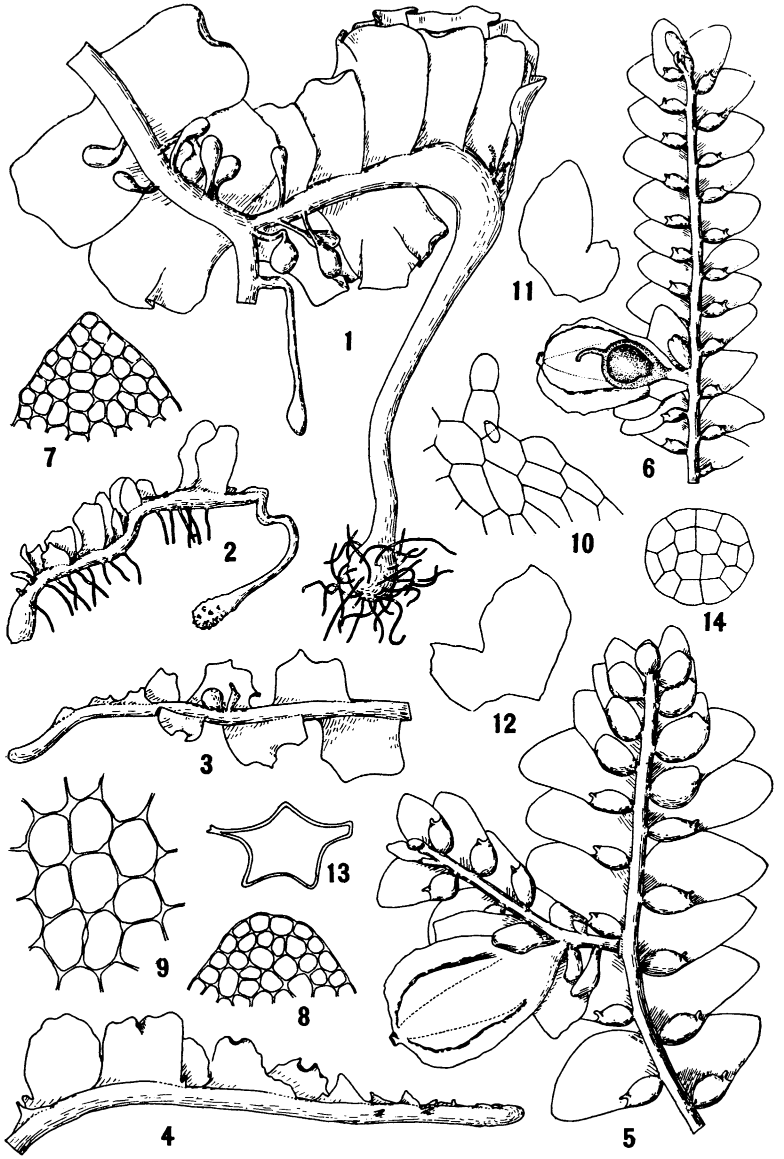
[1] Bull. Torrey Club **29**: 499. *pl. 23, f. 1–7.* 1902.



FOSSOMBRONIA LAMELLATA Steph. Figs. 1–4.
COLOLEJEUNEA SUBCRISTATA Evans. Figs. 5–14.

the state. In the writer's revision of the Lejeuneae of the United States and Canada,[1] published in 1902, only seventeen Lejeuneae were known from Florida and only twenty-one from the whole United States.

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EXPLANATION OF PLATE II

FOSSOMBRONIA LAMELLATA Steph.

FIG. 1. Part of a robust female plant with a large terminal tuber and numerous small tubers, × 8.

FIG. 2. Small unbranched sterile plant with a terminal tuber, × 14.

FIG. 3. Tip of a male plant with rudimentary leaves, × 14.

FIG. 4. Tip of a sterile plant with rudimentary leaves, × 14.

The figures were all drawn from the specimens collected by Mr. Rapp.

COLOLEJEUNEA SUBCRISTATA Evans

FIG. 5. Part of a plant with a perianth and a male inflorescence, ventral view, × 40.

FIG. 6. Branch with a perianth, ventral view, × 32.

FIGS. 7, 8. Apices of lobes, × 200.

FIG. 9. Cells from the middle of a lobe, × 240.

FIG. 10. Apex of a lobule, × 240.

FIGS. 11. 12. Bracts from a single inflorescence, × 40.

FIG. 13. Transverse section of a perianth at about the middle, × 40.

FIG. 14. Gemma, × 240.

The figures were all drawn from the type specimen.

BOOK REVIEW

"The Moss Flora of New York City and Vicinity"

By A. J. GROUT, PH. D.

This interesting volume of 119 printed pages and 12 plates of photographic reproductions of some 20 species, is in the announcement designated as an "annotated list." The modesty of the author is the only explanation for this designation; for it is far more. It will serve very well as a true handbook for studying the mosses of the environs of New York City. The descriptions of families and genera, and the excellent keys to genera and species, with many independent and practically tried diagnostic characters, will prove helpful and inspiring to amateurs and even to professional students. In the genus *Sphagnum* only, the author states, the list and key are "frankly a compilation."

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[1] Mem. Torrey Club **8:** 113–183. *pl. 16–22.* 1902.

[2] Published by the author, New Dorp, Staten Island, N. Y. Oct., 1916.